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ON THE OCCURRENCE OF A TRUE ALLANTOPLACENTA OF THE CONJOINT TYPE IN AN AUSTRALIAN LIZARD.

(Preliminary Communication.)

By Professor T. Thomson Flynn, D.Sc., University of Tasmania, Hobart.

(Figures 1-2.)

My attention was recently directed by Mr. J. R. Kinghorn, of the Australian Museum, to some material in the Museum, registered under the number R.7945, and labelled "Eggs, *Tiliqua scincoides*, loc. Hornsby, N.S.W. Oct., 1922."[1]

The material was found to consist of the two oviducts, in which were contained a number of "eggs," these causing large swellings spaced at intervals along the course of the ducts. When some of these swellings were opened, the interesting fact was revealed that the allantois enters into distinct relationship with the wall of the oviduct, and there is thus produced an allantoplacenta of a very definite type.

The history of this specimen is as follows:—

It was found in a garden at Hornsby, New South Wales, by a lady, who, in ignorance of the harmlessness of the reptile, smashed its head with a spade. In the damaged condition, it was brought to the Museum, and upon examination proved to be a female. The oviducts in their pregnant condition were removed by Mr. Kinghorn, and placed in Bles' fluid (70% alcohol, 90 parts; 5% formol, 7 parts; glacial acetic acid, 3 parts). Later, the material was transferred to alcohol. The adult, in its damaged condition, was not preserved.

There is an element of doubt, very slight it is true, as to whether this adult specimen was correctly identified.

Of the skinks found in New South Wales, there are two which are alike in general appearance and habits, which differ but slightly in their markings, and which are best distinguished by the difference in the arrangement and degree of development of the head shields. These lizards are *Tiliqua scincoides* Shaw, and *T. nigrolutea* Gray. It is probable that both of these are viviparous, but it is a matter for surprise that the records on this subject are so few and so vague.

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[1] The date refers to the time, not of collection, but of registration in the Museum records.

The available evidence is as follows:—

(*a*) Haacke[2] records the viviparity of *Cyclodus Boddaertii,* part Dumeril et Bibron, from South Australia, and states that his specimen contained four embryos, two in each uterus. *C. Boddaertii* is a synonym of the Australian lizard *T. scincoides,* although it is still possible that Haacke had in his possession a pregnant specimen of *T. nigrolutea,* which is also found in South Australia.

(*b*) Graham Kerr[3] refers to *T. scincoides* as being viviparous.

(*c*) Lucas and Le Soeuf[4] make the statement that "*T scincoides* appears to be oviparous, while the young of *T. nigrolutea* are brought forth alive, in each case the number of young being 6 to 15."

(*d*) Mr. E. A. Briggs, B.Sc., of the Zoological Department of the University of Sydney, has allowed me to examine a number of embryos removed from the oviducts of a *Tiliqua* which he believes to have been *T. scincoides,* but on this point he is not perfectly satisfied.

(*e*) In the Australian Museum there are preserved three advanced embryos, registered as R.2493-5, and labelled "Lithgow, April, 1899," and stated to be from *T. nigrolutea.*

In New South Wales, *Tiliqua nigrolutea* is confined to the colder portions, the south and the highlands of the centre. It has not been recorded, so far as I know, north of the Blue Mountains. It is therefore probable that the Hornsby specimen on which this paper is founded and the Sydney University *Tiliqua* (which came from Manly) both belong to the species *scincoides.*

Despite the statement of Lucas and Le Souef, quoted above, it may be taken for granted that each of the New South Wales species of this genus is viviparous.[5]

Description of Material.

This consists of the greater portions of the two oviducts, with the ovaries. At intervals, the ducts are greatly enlarged, each enlargement corresponding to a developing embryo with its membranes and yolksac. Many of the embryos had been taken out of the oviducal swellings, the total number—removed and intact—being fifteen, which agrees with the maximum number given by Lucas and Le Souef for the genus (but see Haacke as quoted above).

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[2] Haacke—Zoologischer Anzeiger, viii, 1885, p. 438.

[3] Graham Kerr—Text Book of Embryology, Vertebrata, London, 1919, p. 482.

[4] Lucas and Le Soeuf—The Animals of Australia, 1909, p. 248.

[5] The matter has been definitely settled in the case of *T. scincoides* by the receipt, after the above was written, of a pregnant specimen of this species. From it were secured eleven embryos, six from the right oviduct, five from the left. These embryos are near full term, with reduced yolksac and well developed placenta, and have the following measurements: Total length, 100 mm.; head length, 22 mm.; length measurement from vent to tip of tail, 31.5 mm.

Each swelling is elliptical in shape, measuring on the average some 23 mm. by 18 mm., the longer diameter lying in the same direction as the length of the duct. There are signs that there has been some shrinkage since the material has been put in spirit.

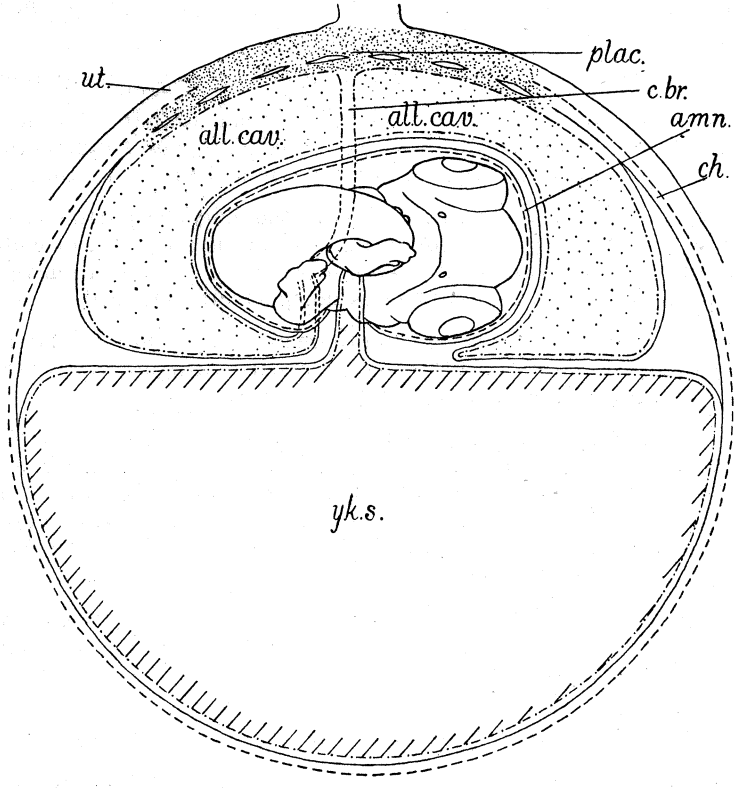

Fig. 1.

Diagram of the Fœtal Membranes of the Embryo of *Tiliqua scincoides* of 8·5 mm.

The ectoderm is indicated by a broken line, the mesoderm by an unbroken line, the entoderm by "dot and dash."

All. cav. = allantoic cavity; *amn.* = amnion; *c. br.* = cellular bridge carrying vessels across the allantoic cavity; *ch.* = chorion; *pl.* = placental formation; *ut.* = uterine wall; *yk. s.* = yolk sac.

Between the enlargements, each oviduct is contracted, having the form of a strap-shaped body measuring some 3 mm. by 5 mm. The length of oviduct between the swellings varies slightly, but it is, on the average, about 10 mm.

Where it is swollen, the wall of the oviduct is thin, and through it the various regions of the embryonic "vesicle" can be made out. The orientation of the vesicle is such that the embryo is towards the mesometrial side of the duct. The embryo measures 8.5 mm. in direct length, and lies with one side on the yolksac. A drawing of it at this stage is shown in Figure 2. The yolksac occupies rather more than half the whole embryonic structure.

Fig. 2.

Embryo of *Tiliqua scincoides* measuring 8·5 in direct length.

The side which the embryo presents to the yolksac is almost invariably the left, in but one case out of twelve there being any exception to this rule. The outlines of the embryos, and particularly their eyes, can be seen through the distended oviduct wall. The yolksac circulation is well established, and extends over the whole of the outer surface of the sac with the exception of a small area at the lower pole. A *sinus terminalis* could not be definitely made out.

There are no traces, as far as can be seen, of shell, shell-membrane, or albumen.

The Allantois.—This consists, as usual, of a stalk and an expanded hollow portion, the vesicle.

The whole allantois is somewhat voluminous, and wraps cosily round the embryo as it lies on the yolksac surface. The stalk of the allantois leaves the body of the embryo just behind the yolkstalk, and passing slightly downward and outward over the posterior end, almost immediately expands to form the extremely tenuous inner wall of the

allantoic vesicle. Posteriorly, the inner wall of the vesicle comes into delicate relationship with the upper surface of the yolksac. Anteriorly it passes over the body of the embryo, coming into intimate union with the amnion. External to this it extends over to the flat upper portion of the yolksac surface.

The outer wall of the allantoic vesicle is thicker and denser than the inner wall. It is this outer wall, naturally, which helps to form the placenta, but only its central portion fulfils this duty, the marginal zone of this face being free and unattached.

The Allantoplacenta.—This is formed by the reaction and, in part, fusion of the fœtal membranes of the embryo with the uterine wall of the mother. The chorion is attached over a wide area, very little of it being free. An examination of the University specimens, which I have been able to see by the courtesy of Mr. E. A. Briggs, brings into prominence the extremely important point that the chorion over the embryo begins to proliferate at a fairly early stage. These embryos measure 4 mm. in direct length, and the allantois is as yet only a thick-walled diverticulum, of small size, from the hind gut. Unfortunately, the maternal structures were not kept, and the important evidence afforded by the uterine wall is not available.

Possessing as I do but one definitely placental stage, it is not easy to state with exactness what alterations have taken place in the various fœtal and maternal structures which enter into the formation of the allanto-placenta.

The union between the chorion and uterine epithelium is very intimate. The uterine epithelium apparently consists of a single layer of very flattened cells, while the chorionic ectoderm has proliferated greatly, is much vacuolated, resembling a typical plasmodium, and is formed, in the main, of markedly enlarged cells with large nuclei and connected together by amœboid processes. These processes insinuate themselves into and between the maternal cells in much the same way as Hill[6] has described for the chorionic cells in the formation of the metrioplacenta of *Dasyurus viverrinus.*

With this previously prepared tissue, the allantois fuses by its placental surface. This is not, at this stage, a complete union, but occurs at a large number of points. Where there is no fusion, the allantoic surface is separated from that of the chorion by spaces which act seemingly as reservoirs for amorphous material apparently secreted by the chorion and obtained from maternal sources.

The area of attachment is discoidal, and measures, approximately, 16 mm. in diameter.

Allantoic Vessels.—The stalk of the allantois carries allantoic vessels to the inner wall of the vesicle, over which they spread, and are then carried round the margin to the placental face.

[6] Hill—Anatomisches Anzeiger, xviii, 1900, p. 369.

But the outer wall of the vesicle is also supplied by vessels which leave the allantoic stalk near the body of the embryo, and pass right across the vesicle to ramify through the mesenchymal layer of the placental face of the allantois. The presence of such a method of transmission of allantoic vessels—by direct cellular bridges across the allantoic cavity—is interesting in that it has already been recorded by Hubrecht[7] for a monodelphian mammal, *viz.*, *Erinaceus*.

The importance of the investigation of the reptilian allanto-placenta cannot be over-emphasised. As Graham Kerr says, in his review of Giacomini's work on *Chalcides* (*Seps*), it is likely to prove the beginning of a new and important chapter in vertebrate embryology.[8]

Arrangements are now being made for the collection of further stages in the development of *T. scincoides* and *T. nigrolutea*, and, it is hoped that, with the help of these, it will soon be possible to publish a more detailed and connected account of this most important and significant phenomenon.

In conclusion, I must express my thanks to the Trustees of the Australian Museum and to their Director, Dr. C. Anderson, M.A., for permission to use the specimen and for accommodation and materials while working on it. To Mr. Kinghorn I can only express my appreciation of the skill and enthusiasm shown by him in dissecting, fixing and preserving this unique specimen.

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[7] Hubrecht—Quart. Journ. Micr. Sci., xxx, 1889, pp. 307-8.

[8] It is unfortunate that none of Giacomini's earlier papers appear to be available in Australia.